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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/814,992	03/31/2004	Ruvin Deych	56229-153 (ANA-248)	8176
7590	06/16/2006			EXAMINER HO, ALLEN C
Toby H. Kusmer McDermott, Will & Emery 28 State Street Boston, MA 02109			ART UNIT 2882	PAPER NUMBER

DATE MAILED: 06/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/814,992	DEYCH ET AL.
	Examiner Allen C. Ho	Art Unit 2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 30 March 2006.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-22 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-22 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 31 March 2004 is/are: a) accepted or b) objected to by the Examiner.
 

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1, 2, 4-17, and 19-22 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for determining operating voltage between a cathode and an x-ray emissive target, does not reasonably provide enablement for determining the operating voltage for other components in an x-ray apparatus. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

The specification only discloses determining and setting operating voltages between a cathode and an anode in an x-ray tube. The specification does not enable any person skilled in the art to determine operating voltage for other components, such as an x-ray detector or a controller.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 18 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 18 recites "said processor is further configured to determine the optimal values of one or more x-ray exposure parameters, and wherein said x-ray exposure parameters include at least one of operating voltage (kVp), current (mA), and size of focal spot;" However, claim 16 claims a processor configured to calculate an optimal operating voltage. Therefore, operating voltage should be deleted from this list of x-ray exposure parameters, since claim 16 already claims a processor configured to determine an operating voltage.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 2, 7, 8, 11, and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Unger *et al.* (U. S. Patent No. 6,501,819 B2).

With regard to claim 1, Unger *et al.* disclosed a method for optimizing radiographic image quality by irradiating the object with x-rays from an x-ray apparatus during an initial period of an x-ray exposure, the method comprising:

- A. determining a first operating voltage level  $kVp_0$  for initial operation of the x-ray apparatus (default exposure settings, column 4, lines 7-14);
- B. during a first sampling interval  $\Delta t_1$  in the beginning of the x-ray exposure period, operating the x-ray apparatus at the first voltage level  $kVp_0$  and using one or more sensors to

detect x-rays that have passed through at least a portion of the object during the interval  $\Delta t_1$  (first image, column 4, lines 7-14);

C. after the first sampling interval  $\Delta t_1$ , processing the output signals from the sensors to determine a second operating voltage level  $kVp_1$  (column 5, lines 22-33);

D. during a second sampling interval  $\Delta t_2$ , operating the x-ray apparatus at the second voltage level  $kVp_1$  and using the sensors to detect x-rays that have passed through at least a portion of the object during the interval  $\Delta t_2$  (second image, column 5, lines 34-36);

E. after the second sampling interval  $\Delta t_2$ , processing the sensor output signals to determine an optimal value  $kVp_2$  for the operating voltage level, and setting the operating voltage level of the x-ray apparatus to the optimal value  $kVp_2$  for the remainder of the x-ray exposure period (adjusting exposure settings of 3<sup>rd</sup> image based on 2<sup>nd</sup> image, column 8; lines 25-27).

With regard to claim 2, Unger *et al.* disclosed a method in accordance with claim 1, wherein the x-ray apparatus comprises an x-ray source (required to produce x-rays).

With regard to claim 7, Unger *et al.* disclosed a method in accordance with claim 1, wherein the object comprises anatomical tissue of a patient, and wherein the optimal value of the operating voltage are chosen so that the patient's exposure is substantially minimized when the x-ray apparatus is operated at the optimal value (column 8, line 67 - column 9, line 1).

With regard to claim 8, Unger *et al.* disclosed a method in accordance with claim 2, wherein the x-ray imaging system comprises a flat panel detector (220).

With regard to claim 11, Unger *et al.* disclosed a method in accordance with claim 1, wherein the object comprises anatomical tissue of a patient, and further comprising the step of

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measuring the thickness of the tissue before the step of determining the first and second operating voltage levels (column 6, lines 15-26).

With regard to claim 15, Unger *et al.* disclosed a method in accordance with claim 1, wherein steps B and C are repeated for a plurality of n sampling intervals during which the x-ray apparatus is operated at corresponding operating voltage levels, so that the optimal voltage level  $kVp_2$  is determined based on sensor output signals generated while the x-ray apparatus was operated at voltage level  $kVp_1^n$  during a sampling interval  $\Delta t_1^n$  (column 8, lines 25-27).

#### *Claim Rejections - 35 USC § 103*

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Unger *et al.* (U. S. Patent No. 6,501,819 B2) as applied to claim 2 above, and further in view of Macovski (U. S. Patent No. 4,686,695).

With regard to claim 3, Unger *et al.* disclosed a method in accordance with claim 2. However, Unger *et al.* failed to teach that the operating voltage is the accelerating voltage between an electron source and an x-ray emissive target within the x-ray source.

Macovski disclosed an x-ray source comprising an electron source (12) and an x-ray emissive target (13). Macovski taught that the energy of the x-rays could be changed by

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changing the accelerating voltage between the electron source and the x-ray emissive target within the x-ray source (column 5, lines 40-46).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide an x-ray source having an electron source and an x-ray emissive target and to adjust the accelerating voltage between the electron source and the x-ray emissive target, since a person would be motivated to change the energy of the x-rays.

With regard to claims 4 and 5, Unger *et al.* and Macovski disclosed a method in accordance with claim 3, further comprising determining the optimal values of additional x-ray exposure parameters comprising x-ray tube current (column 5, lines 30-33).

9. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Unger *et al.* (U. S. Patent No. 6,501,819 B2) as applied to claim 1 above.

With regard to claim 6, Unger *et al.* disclosed a method in accordance with claim 1. However, Unger *et al.* failed to teach that each sampling interval is relatively small compared to the x-ray exposure period.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to select sampling intervals that are relatively small compared with the x-ray exposure period, since a person would be motivated to reduce x-ray dose received by the patient.

#### ***Allowable Subject Matter***

10. Claim 18 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter:

With regard to claim 18, although the prior art discloses an x-ray apparatus comprising an x-ray source comprising an electron source and an x-ray target, an x-ray imaging system configured to receive x-rays that have been emitted from the x-ray source and that have passed through the object and to generate an image of the object from the received x-rays, and a controller configured to adjust the accelerating voltage between the electron source and the x-ray target in the x-ray source, it fails to teach or fairly suggest that the x-ray apparatus further comprises one or more sensors disposed between the object and the x-ray imaging system, the sensors being configured to detect x-rays and to generate output signals representative of the attenuated intensity of the detected x-rays, and a processor configured to determine operating voltage levels by processing the output signals generated by the sensors as claimed.

#### *Response to Arguments*

12. Applicant's arguments filed 30 March 2006 with respect to the specification have been fully considered and are persuasive. The objection of the specification has been withdrawn.

13. Applicant's arguments filed 30 March 2006 with respect to claims 1, 16, and 18 have been fully considered and are persuasive. The objections of claims 1, 16, and 18 have been withdrawn.

14. Applicant's arguments filed 30 March 2006 have been fully considered but they are not persuasive.

With regard to claims 1, 2, 4-17, and 19-22, the applicants argue that the operating voltage is the accelerating voltage between an electron source and an x-ray emissive target

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within an x-ray source as recited in some of the claims. This argument is not persuasive. The fact that this recitation exists only in some of the dependent claims is evidence that the applicants intend to claim an operative voltage that is broader than the accelerating voltage between an electron source and an x-ray emissive target within an x-ray source. The intend to claim a broader operating voltage is further evidenced by claiming not an x-ray source, but an x-ray apparatus, which may comprise additional components other than an x-ray source. Therefore, the rejection of claims 1, 2, 4-17, and 19-22 under 35 U.S.C. 112, first paragraph, is being maintained.

The applicants argue that Unger *et al.* failed to disclose element B of claim 1. The examiner respectfully disagrees. It is noted that the features upon which applicant relies (*i.e.*, a first sampling interval that is much less than that of the x-ray exposure period) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

The applicants argue that Unger *et al.* failed to disclose element C of claim 1. The examiner respectfully disagrees. Unger *et al.* disclosed a method that processes the output signals (first image) to determine a second operating voltage level (column 5, lines 22-33) based on the characteristics of the anatomy. The characteristics of the anatomy is identified by segmenting the first image (130).

The applicants argue that Unger *et al.* failed to disclose element D of claim 1. The examiner respectfully disagrees. Again, the applicants relied upon a feature not recited in the claim.

The applicants argue that Unger *et al.* failed to disclose element E of claim 1. Specifically, the applicants argue that Unger *et al.* failed to disclose determining an optimal value for the remainder of the single x-ray exposure period. The examiner respectfully disagrees. The examiner considers the entire process to be a single x-ray exposure period. Specifically, the single x-ray exposure period disclosed by Unger *et al.* comprises a plurality (n-1) of sampling intervals. An operating voltage based on an output (image) of one or more sensors (220) is determined during each of the (n-1) sampling intervals. The final nth image is taken in the remainder of the x-ray exposure period.

Therefore, the rejections are being maintained.

### *Conclusion*

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (571) 272-2491. The examiner can normally be reached on Monday - Friday from 8:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward J. Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*Allen C. Ho*  
Allen C. Ho, Ph.D.  
Primary Examiner  
Art Unit 2882

12 June 2006